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ABSTRACT

A programed text designed to teach library students basic manual flowcharting techniques is presented. A statement of behavioral objectives indicates that the text will teach the student to: define the process of flowcharting, list its uses and distinguish between programing and systems flowcharts; specify flowchart input and output; analyze the task, write it up, and deal with it as a process or a decision; translate the process into terms and construct a flowchart using symbols on a template; check routines; find errors; and translate a narrative description into correct flowcharting format. The text was validated by pre- and posttesting groups of students with the text and in traditional classroom instruction. The text is followed by a test which evaluates knowledge gained from the programed unit. (LS)

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FLOWCHARTING FOR LIBRARIES:

A PROGRAMMED TEXT

by

Edward John Kazlauskas

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PREFACE

Essential to an introductory course on library systems analysis and data processing, and indeed for working librarians, is a knowledge of basic flowcharting techniques. This knowledge is essential for students and librarians to document the manual library operations under analysis. At this point in time only manual flowcharting is considered since computer flowcharting requires prerequisite computer knowledge.

Previously basic manual flowcharting was taught in a traditional lecture manner with the instructor providing the students with practice exercises to flowchart. Some difficulty was evidenced by students when they attempted to complete their basic systems analysis paper, which was to incorporate manual flowcharting as an integral part of the report. Thus, some programmed instruction material was developed to provide a viable learning alternative on the basics of flowcharting.

This text is the result of this development. Editing and developmental testing were achieved via critiques by graduate students in a course in Programmed Instruction. Validation of the program was achieved by administering an entry test, pretest, posttest, and programmed material to

an evening section of the basic Systems Analysis course. The results of the validation were used for additional grammatical and logical error correction. The results also indicated significant gain scores. Upon completion and review of the validation testing, the following test was performed using the day section of the Systems Analysis course. An experimental group of students, randomly chosen from the class, were given a pretest, posttest, and programmed materials. The control group was given a pretest, and posttest, but instead of the programmed materials, were exposed to the information on manual flowcharting via a traditional classroom approach. Comparison tests between the scores of the two groups, time and cost studies on student completion on the program, and attitudinal tests indicated that these materials were indeed a viable alternative to the more traditional approach. As such, they have been incorporated into the regular teaching program in Systems Analysis.

A number of people have been quite helpful in assisting in the development of these materials. I am grateful to Dr. Herbert Miller and Dr. Frederick Knirk of the Instructional Technology Department of the University of Southern California for their critiques and encouragement.

I indeed must give thanks to the students of Systems Analysis for their interest and enthusiasm in this programmed approach.

E.J.K.
University of Southern California

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I. INTRODUCTION

The material which follows is a programmed text on manual flowcharting. Although the original audience for this material was library school students, the material can be equally useful to working librarians, or indeed any library employee who needs to learn the basics of manual flowcharting. As such, this program can be used not only in a formalized library school environment, but also for in-service systems analysis training.

Programmed materials are designed to lead you step-by-step through a body of knowledge. The instruction is based on your orderly progression through increasingly more complex materials, and necessitates your active participation via response to questions. Before you begin this program you may want to read the set of behavioral objectives which accompany this program (these are found in the appendix). These behavioral objectives state precisely what you are to learn in the form of a change in behavior, and also specifies the conditions and standards by which this change in behavior can be measured.

You are now ready to use this program and in order to do this properly please read carefully the following instructions.

Place a piece of paper over the first page of the actual program, and only leave the first frame exposed (a frame refers to one distinct unit which will provide you with some narrative or descriptive information and then ask you some sort of question based on this information). The black dots on the page can be used to act as a guide to make sure that you do not accidently expose the answer. Therefore expose the frame only up to the black dot and no further. After reading the first frame information and responding to the question, move the paper to expose the answer. Check you answer against the correct response and then continue on by moving the paper and reading the next frame. Respond to the next question and then check your answer. Continue this procedure until you complete the program. In some cases the answers to the questions will be located on another page of the program. In these cases check that page for the correct response and verify it against your own. After checking your response, return to the main part of the program from where you left off and continue with the next frame number. A flowcharting template is required to use the program. This can be purchased at most collegiate or technical bookstores. An IBM template is preferred. Use this template whenever instructed to by the program.

Now turn the page and begin.

II. PROGRAM ON MANUAL FLOWCHARTING

Frame 1

The activities performed in an organization can be described in a narrative manner. However, a technique called flowcharting has been developed to graphically illustrate these activities.

This graphic technique called _____ is a process of dividing a complex problem or activity into parts and representing this using a number of symbolic conventions.

•

flowcharting

Frame 2

Flowcharting is thus which of the following:

a. a process
b. a graphic representation of an activity
c. a method of dividing a complex problem into parts

•

all the above

Frame 3

A flowchart can be used:

a. to document an activity
b. in evaluating a system
c. by the systems analyst
d. to divide a complex problem into parts

•

all the above

Frame 4

Now utilizing the information from the preceding frames see if you can provide a narrative definition of flowcharting.

•

your definition should have included that flowcharting is a process, divides an activity into parts, and does this graphically using standard symbols.

Frame 5

Please list three separate purposes of flowcharts.

•

to document an activity
in evaluating a system
to divide a complex problem into parts

Frame 6

Flowcharting symbols, standardized by the United States Standards Institute (USASI), can be found on most flowcharting templates, a drawing guide which helps you complete the symbols correctly..

A flowchart utilized standardized _____ which can be found on flowcharting _____.

•

symbols
templates

Frame 7

Now examine a flowcharting template which you should have procured through your bookstore or some other source (an IBM flowcharting template is preferred). Note that the template is housed in a paper holder. Continue onto the next frame for the appropriate frame question.

List at least five characteristics or observations about the template and its paper holder.

1. template is made of plastic
2. the template can also act as a ruler
3. there are a variety of punched out symbols in the body of the template
4. the template is transparent
5. the actual template is divided into a graph
6. a guide to the various symbols is found on the paper holder
7. the template is prepared by IBM (if appropriate)
8. the paper guide lists both systems and programming symbols

---

Frame 8

You will notice that the template distinguishes between systems and programming flowchart symbols. For our manual flowcharting purposes both systems and programming symbols will be used to graphically describe manual activities. However, the flowcharts we will be drawing will be systems flowcharts and not programming.

The two types of flowcharts are called _____ and _____ flowcharts.

systems
programming

Frame 9

The basic difference bewteen these two types of flowcharts, systems and programming, is in their level of complexity. The system flowchart, prepared by a systems analyst, is used in describing an operation for documentation, evaluation, and design. A programming flowchart, prepared by a computer programmer, is used as a guide in detailing instructions to the computer and usually indicates the sequence of logical and arithmetic operations required before the computer program can run.

Which type of flowchart is prepared by a systems analyst?

- systems flowchart

Which type of flowchart would be more detailed and can be used as a guide for computer programming?

- programming flowchart

Which type of flowchart would utilize standardized flowcharting symbols found on a flowcharting template?

- both systems and programming flowcharts

Which type of flowchart would be used in documenting the results of a systems analysis?

- systems flowchart

Frame 10

Flowcharts may also be classified according to levels. In manual flowcharting there are three generally accepted levels: the system schematic, the general flow diagram, and the detailed flow diagram. These levels are distinguised by their level of complexity. The schematic provides an overview of an operation and usually consists of somewhere between 5 and 10 symbols. The general flow diagram takes this same operation as drawn in the schematic and divides it into smaller, isolatable components consisting of anywhere from 10 to 100 or more symbols. The detailed flow diagram goes into much more detail and can contain anywhere from 100 to 1000 or more symbols. The flowcharts you will be drawing will be primarily of the first and second level.

What are the three levels of manual flowcharts?

1. _____
2. _____
3. _____

●

system schematic; general flow diagram; detailed flow diagram

---

Frame 11

Many times it is difficult to distinguis amongst different levels of flowcharts since the number of symbols would naturally depend on the complexity of the process. What is most important, however, is that the activities in your flowcharts be of the same level. For example, ordering a book and cataloging a book are on the same level of complexity, but ordering a book and moving a truck of monographs from acquisitions to cataloging are not on the same level of complexity.

What is one of the important considerations in drawing a manual flowchart ?

●

consistency; that the level or complexity of activities/ processes described in a flowchart are similar

Frame 12

For our immediate purposes we will begin with a small set of symbols for manual flowcharting. Besides the knowledge of these symbols and their names, it it is also important to know the order in which they are drawn on a flowchart.

Therefore before we bgin to flowchart we need to know:

1. _____
2. _____

o

basic flowcharting symbols and their names
order in which they are drawn

Frame 13

Traditional flowcharting conventions suggest that you begin at the upper left hand side of a page approximately two inches from the top and from the left margin. Flowcharting conventions also indicate that flowcharts then proceed from the top of the page to the bottom in a vertical manner.

Which of the following conventions about drawing flowcharting symbols are correct:

a. proceed in drawing symbols from the top of the page to the bottom
b. begin your flowchart at the top of the page approximately at the middle
c. begin charting approximately two inches from the left margin

o

a and c are correct. If you responded b please remember that flowcharts usually do not begin in the middle of the page but rather near the left margin

Now we are ready to begin drawing the flowcharting symbols. Please continue onto the next page.

Frame 14

The first symbol which is always drawn on a flowchart is the start symbol. Look at your flowcharting template holder and find the terminal symbol. The start symbol consists of this terminal symbol with the word 'start' written into it. Now draw below this symbol with the word 'start' in it..

see page 1 in confirmation section

Frame 15

The second symbol which is drawn on a flowchart is the input symbol.Look at your flowcharting template and using it draw a correct version of the input symbol.

see page 2 in confirmation section

Frame 16

The third symbol which is always drawn on a flowchart is the process symbol. Using your flowcharting template draw a correct version of this.

see page 3 in confirmation section

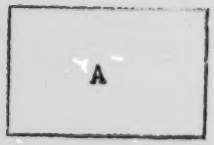
Frame 17

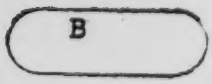
Another symbol used in basic manual flowcharting is the decision symbol. Look at your flowcharting template and using it draw a correct version of a decision symbol.

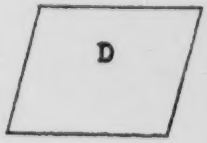
see page 4 in confirmation section

Frame 18

Now please match the following symbols with their correct functions.







1. input _____
2. process _____
3. start _____
4. decision _____

1,D; 2,A; 3,B; 4,C

Frame 19

The majority of other symbols you will need to known in order to draw manual flowcharts are variations of these basic symbols. The last symbol drawn on a flowchart is the same as the first symbol whihc is drawn. Please draw this symbol with the word 'halt' written in it.

see page 5 in confirmation section

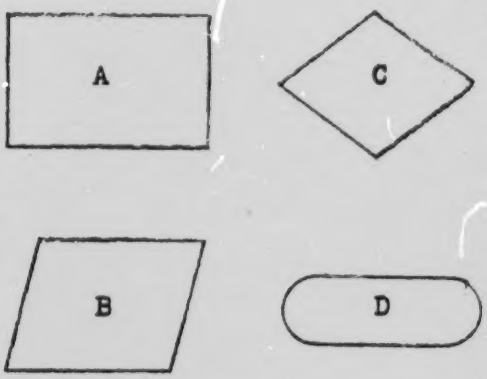
Frame 20

As you remember from your systems concepts, the product of a system is the output. The output symbol is the same as the input symbol. Please draw below a correct version of the output symbol.

see page 3 in confirmation section

Frame 21

Now please match the following symbols with their correct functions.



1. decision _____
2. output _____
3. input _____
4. halt _____
5. process _____
6. start _____

1,C; 2,B; 3,B; 4,D; 5,A; 6,D

Frame 22.

Now you should have in your repertoire four separate symbols which can graphically illustrate six separate functions. Using the next page of this program, see if you can draw each of these symbols and indicate their meaning. Please turn to the next page.

Please draw the symbols and indicate their function on this page.

Please check page 4 in confirmation section, then continue on to the next frame

Frame 23

From the preceding frames on the basic flowcharting symbols, information was supplied on the location of these various symbols on a flowchart. See if you can match the following symbols with their location on a flowchart.

A. process	1. the first symbol which appears	____
B. input	2. the second symbol which appears	____
C. start	3. the last symbol which appears	____
D. halt	4. the third symbol which appears	____
E. Decision	5. the second from the last symbol which appears	____
F. Output		

1,C; 2,B; 3,D; 4,A; 5,F

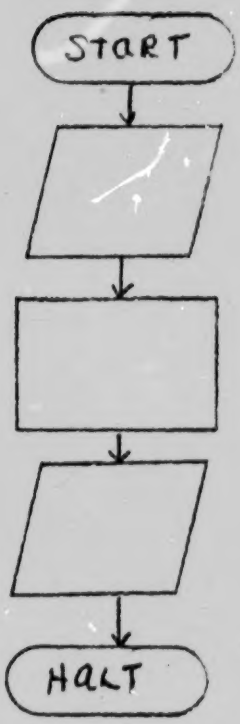
Frame 24

Now all that is needed is a line with a directional arrow to indicate the flow or sequence of activity within a flowchart. Using your flowcharting template draw a vertical directional line of approximately one inch in length with a directional arrow pointing the direction downward.

see page 1 in confirmation section

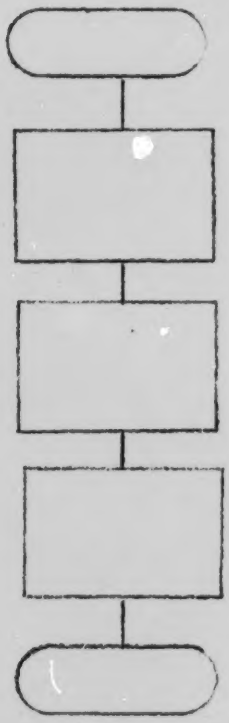
Frame 25

Using the basic flowcharting symbols and the directional line and arrow we are able to construct a complete flowchart as shown below.



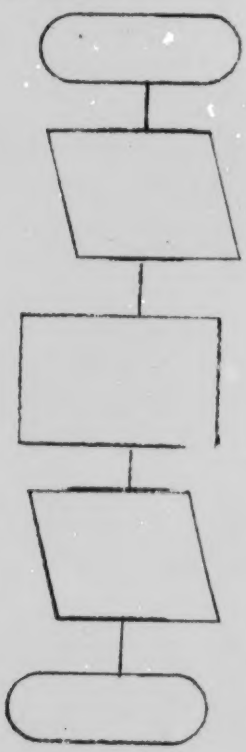
Now using this flowchart as a guide and also incorporating your knowledge attained from the preceding frames, see if you can list next to the flowcharts on the next page the appropriate flowcharting errors. Please turn to the next page.

Flowchart A



error listsing (if any)

FLOWCHART B



Please go on to the next page for confirmation of your responses.

Error listing for flowcharts on preceding page.

Flowchart A
1. no input
2. no output
3. start/halt not written into symbols
4. directional arrows missing

Flowchart B
1. input and output symbols reversed, in other words, drawn backwards
2. start/halt not written into symbols
3. no directional arrows

Frame 26

A person flowcharting an operation must transcribe that operation into its correct flowcharting format. Now that you are familiar with the basic symbols and their order on a flowchart, lets see if you can flowchart an operation which is described narratively.

> The typist takes the 3x5 inch written order card requests and types the information from the card onto a purchase order form.

The first responsibilty of a person translating a narrative description into a flowchart is to translate the process or activity into a phrase of not more than ten words in length. This is the heading phrase for the process or activity. This heading phrase, or title, should be descriptive of the process or activity and should be clear and not vague.

Which of the following headings would be appropriate for the process described narratively above:

a. process of typing requests
b. typing routines
c. typing purchase order

c is correct. a and b are too general and could refer to various typing activities, and not those specifically for typing purchase orders.

Frame 27

Using the blank page which is found on frame 35 of this program, write the correct heading phrase from frame 26 across the top of the page as a title. After you have done this continue on to the next frame. Confirmation for the flowchart which you are drawing on frame 35 will not be given until the flowchart is completed.

Frame 28

Now what is the first symbol which we would draw on this page.

•

the start symbol. OK, now using your template please draw this on frame 35 .

Frame 29

The next thing to determine is the _____ to the system which you are flowcharting.

•

input. Now please draw the input symbol under the start symbol on the flowchart.

Frame 30

The person flowcharting must transcibe the input described narratively into a phrase of not more than six words in length and then place this into the input symbol.

Which of the following would be appropriate as an input to our flowchart on 'typing purchase orders':

a. 3x5 order requests
b. type order requests
c. 3x5 requests for items to be purchases
d, received order requests

•

a and d are correct; b is a process and not an input; c is too long of a phrase for an input

Place the response corresponding to a or d into the input symbol which you have drawn on frame 35 .

Frame 31

The next symbol which would appear would be a(n) _____ symbol.

o

process

Frame 32

The person flowcharting must translate the process into a phrase of not more than six words in length and place this phrase into the process symbol.

Which of the following would be appropriate as a process in our flowchart for the narrative process described in frame 26.

a. type onto order form
b. prepare order forms
c. process of typing order request data onto forms for ordering

o

a is correct; b is too vague, how are you to prepare order forms?; c is too long of a phrase.
Now please draw a process symbol with the correct phrase in it under the input symbol on frame 35 .

Frame 33

Now the next thing for the person flowcharting to do is to determine the _____ of the system.

o

output

Frame 34

The output must be translated into a phrase of not more than six words in length, and this phrase then placed into the output symbol on the flowchart. What is the appropriate output for the process described in frame 26.

•

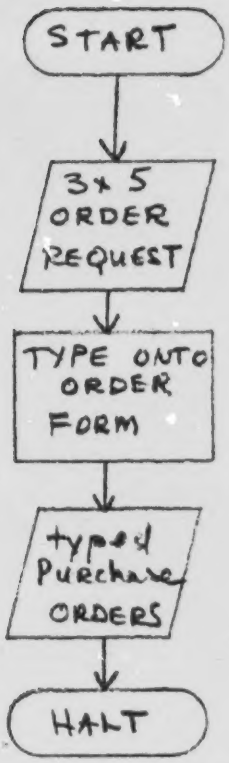
typed purchase order. Now please place this phrase in the output symbol and draw this on frame 35 .

Frame 35

Now draw the last symbol on your flowchart below. Be sure to connect the symbols using a directional line and arrow.

Please draw your flowchart in the space provided below.

Please turn the page to verify the correctness of your flowchart.



Frame 36

Now read the following narrative description of a process:

> The receiving clerk takes the received book, stamps our property symbol onto the back of the front cover, place a yellow flyer into the book, and then puts the book on a book truck

You probably can observe that this description is a little more complex than the previous narrative description which you flowcharted. Why?

This process is more complex; it involves more than one individual activity; in fact, it involves a series of process activities.

Frame 37

Which of the following is an appropriate phrase to describe the activity mentioned in the previous frame.

a. processing book materials
b. routines involved in checking-in ordered books
c. book receiving routines

c is correct; b is too long of a title phrase, a is too general since processing books can refer to a multiplicity of activities

---

Frame 38

Typically most flowcharts do consist of a number of processes. Using the narrative from frame 36, list the major processing tasks performed.

1. takes the received book
2. stamps property symbol on back of front cover
3. places yellow flyer into book
4. places book on book truck

Frame 39

After listing tasks the person flowcharting must check to see if the tasks are arranged in a logical order. Which of the following listing of tasks are incorrect? Correct the logical order if necessary.

A	B
1. start car	1. stamp due date in book
2. drive away	2. bring book to circulation desk
3. place key into ignition	3. check patron and book cards
4. get into car	4. give book to patron

Both are incorrect. The sequence or logical order should be A: 4,3,1,2 and B: 2,3,1,4

Frame 40

The response to frame 38 listed the tasks in their logical order. The person flowcharting must now check to be sure that the task phrases are not longer than six words. Check the tasks listed in frame 38 and rephrase if necessary. Write the four tasks below.

1. take received book
2. property stamp book
3. place yellow fyer into book
4. place on book truck

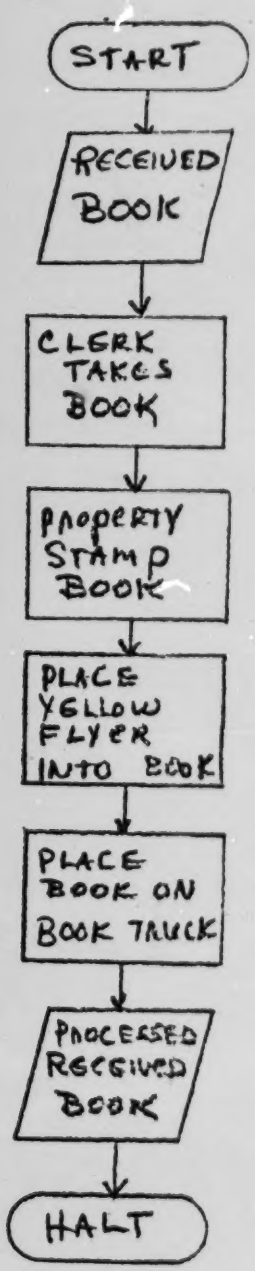
Frame 41

Now using your task phrases, place them into their appropriate symbol along with the other necessary symbols required to constuct a flowchart. Use the heading phrase you chose as a response to frame 37.

Use the next page to draw a correct version.

Please turn to the next page to confirm your response

BOOK RECEIVING ROUTINES



Please note that slight variations of the above flowchart are acceptable, i.e. variations of the phrases within the symbols. However, the meaning must remain the same as in the flowchart above.

Continue the program on the next page.

Frame 42

None of the previous examples have utilized decision tasks. Now using the following narrative description of a system, list a phrase title which best describes the system, the input and output of the system, and the processing tasks.

> I check the student I.D. forms to be sure that their social security numbers are included. If the number is not on the form, I check the registrar's list by name and write the located social security number on the form. Then the forms are forwarded to the circulation clerk.

Please respond to the questions for this frame in the space below.

phrase title: checking student ID forms for social security numbers
input: student ID forms
output: checked forms sent to circulation clerk
tasks: check forms for social security numbers
write numbers onto form
send to circulation clerk

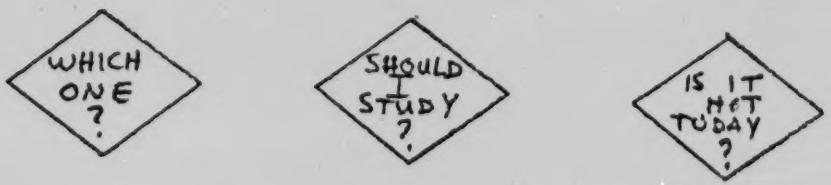
Frame 43

The phrase 'if they are not on the form' in the previous narrative is not an input/output or a task process. It is considered a decision activity. This activity is diagramatically represented by what symbol. Please draw this below.

see page 2 in confirmation section

Frame 44

The person flowcharting must translate a decision activity into a yes/no question phrase or not more than six words and place this phrase into the decision symbol. Which of the following flowcharted decisions are correct?



A B C

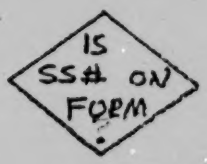
B abd C are correct; A cannot be answered by a yes/no response.

Frame 45

Now using the narrative in frame 42, determine which of the following flowcharted decisons is correct.

ss# = social security number

A



B

o B is correct; A is a process not a decision since it cannot be answered by a yes/no response. Also note that if you are to utilized abbreviations in any of your symbols, a table of these abbreviations and their appropriate meaning must be provided.

Frame 46

When a decision symbol is encountered the resulting yes/no activities must be indicated on the flowchart. This technique in flowcharting is called branching.

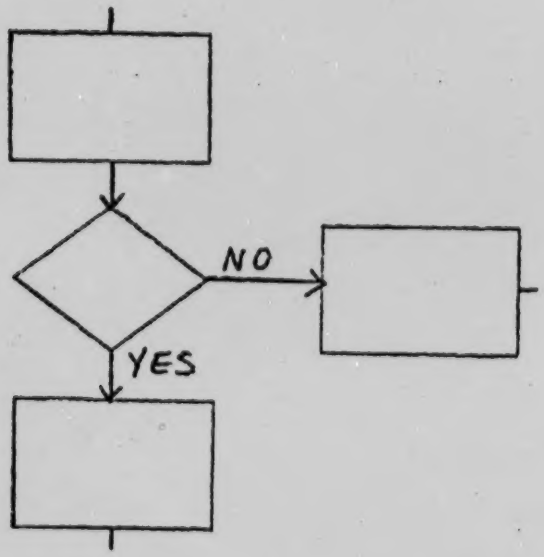
A decision activity on a flowchart involves which of the following:

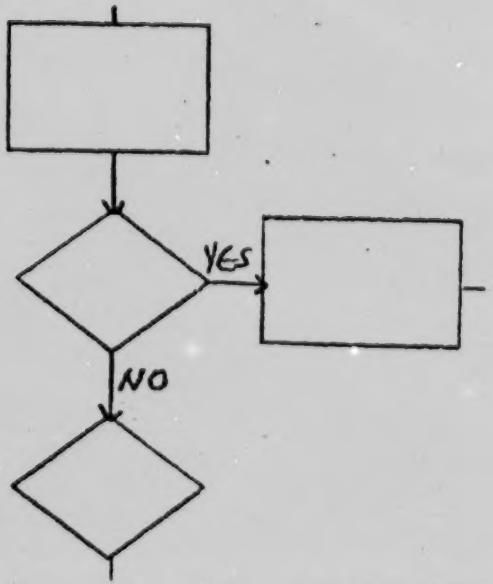
a. a yes/no response
b. branching
c. resulting activities/decisions
d. a question

o all are correct

Frame 47

Typically this branching technique is drawn on the flowchart in the following manner. Please note that the below are not complete flowcnarts but rather segments of complete charts.





You will notice in the above examples that it makes no difference in which direction the yes/no response goes, or what symbols follow a decision symbol. What is important is that a yes/no reponse does follow a decision along with two other symbols, naturally with the exclusion of an input/output or start/halt symbol.

Which of the following is true:

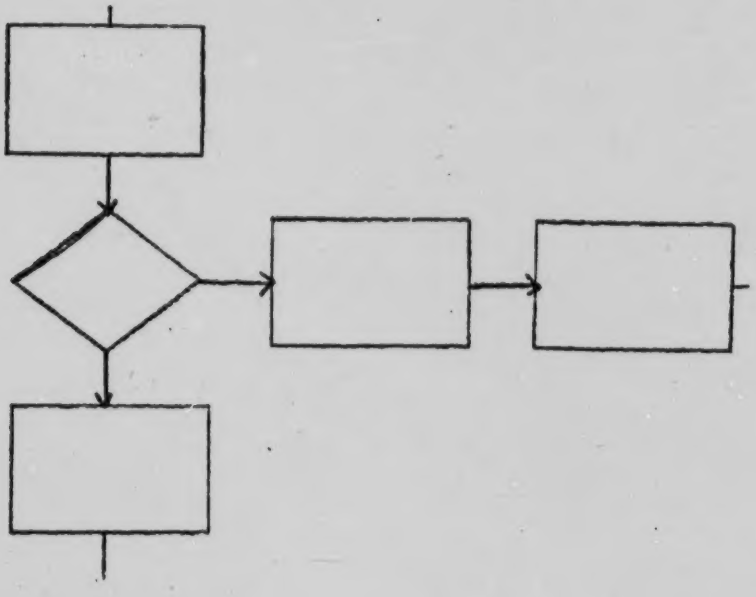
a. Every decision must have a yes/no response.
b. Only process symbols can follow a decision symbol.
c. It makes little difference as to whether the yes response to a question moves in a vertical or horizontal position on the flowchart.

o

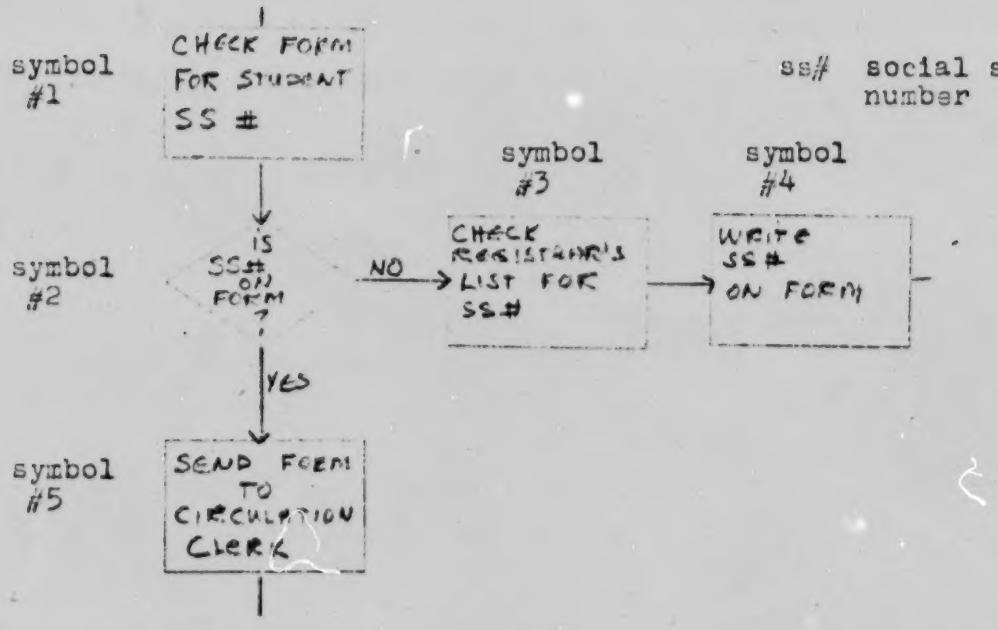
a and b are true.

Frame 48

Utilizing the narrative in frame 42, fill in the following symbols with the correct phrases.



Please go on to the next page to confirm your response.



Frame 49

In looking at the above flowchart you will notice that once the process in symbol #4 is completed the next process is the same as in process symbol #5. The person flowcharting must connect process #4 to process #5. There are two options available: the on-page connector symbol or a connector line.

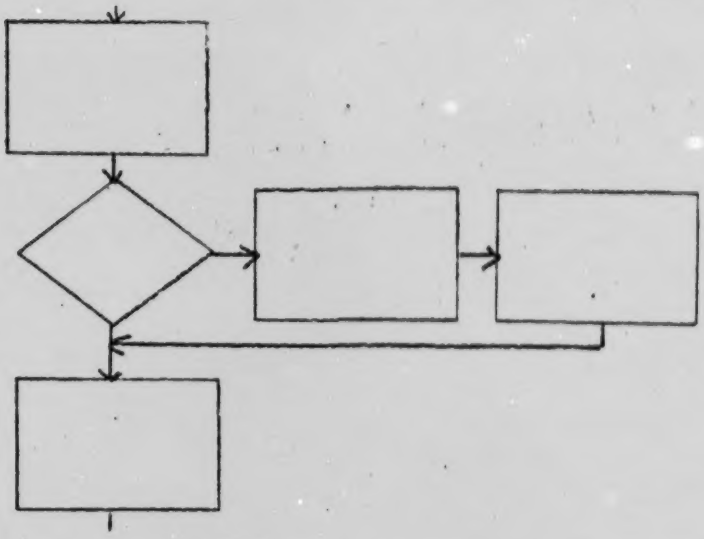
The two options available to connect one branching activity to another part of the flowchart are:

1._____ 2._____

connector line
on-page connector symbol

Frame 50

The use of the line connector is illustrated below.

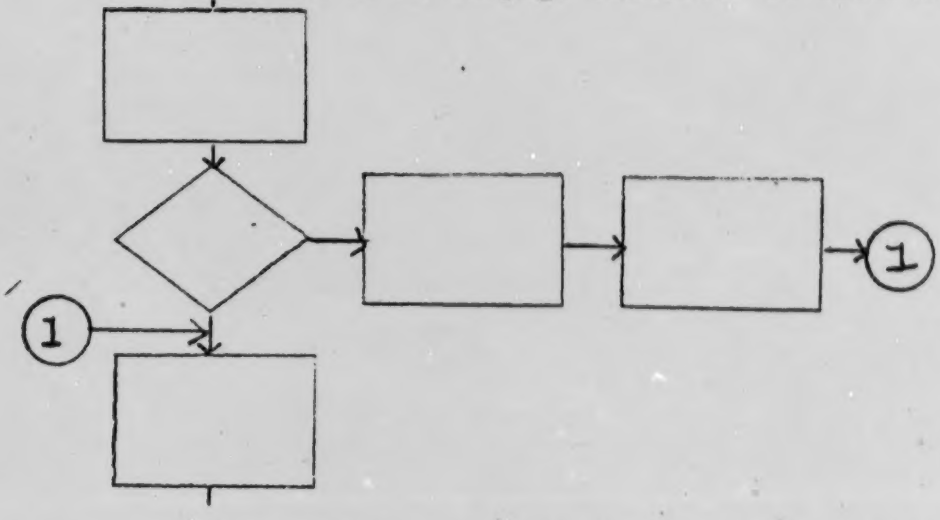


Frame 51

Now using your flowcharting template draw an on-page connector symbol. Please note that this symbol is simply entitled connector on the template guide.

see page 1 in confirmation section

The use of an on-page connector is illustrated below.

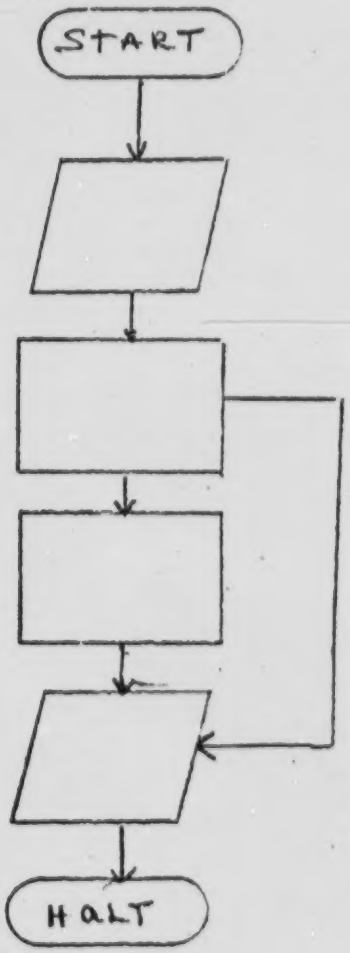


It should be noted that any number or letter may be used in the symbol. This is up to the discretion of the flowcharter.

Frame 52

Please specify the errors in the following flowcharts.

Flowchart A



error listing(if any)

_____

_____

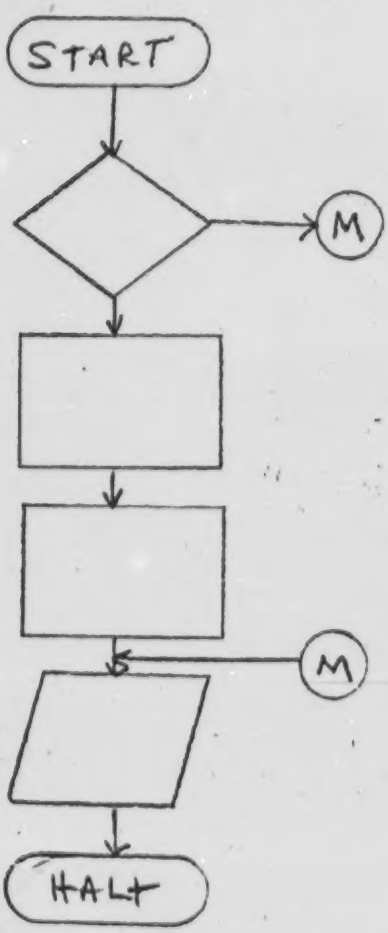
_____

_____

_____

Please continue onto the next page for more sample flowcharts.

Flowchart B



error listing (if any)

Flowchart A
1. a decision symbol required for branching
2. connector line comes into symbol rather than the directional line immediately above the symbol

Flowchart B
1. no input
2. no initial process
3. second on-page connector symbol on wrong side of flowchart, should be from the left side of the chart
4. no yes/no with decision symbol

Frame 53

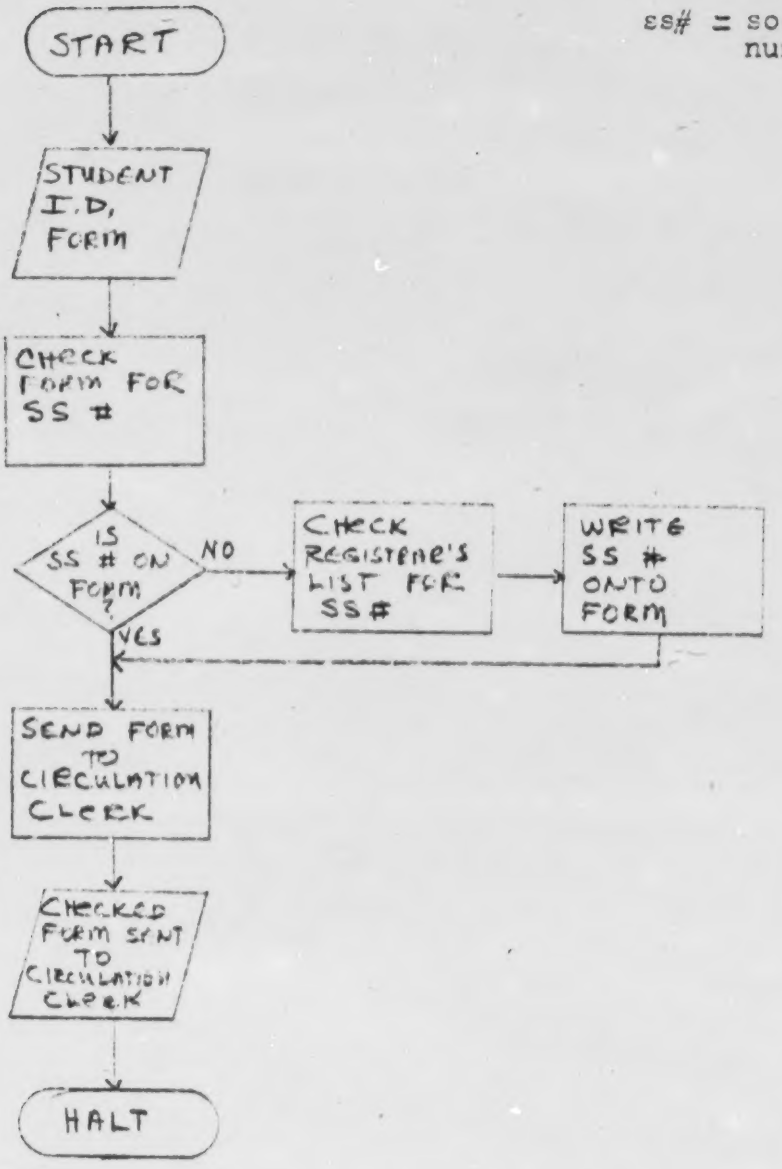
Referring back to frame 42, use the narrative description of the process and draw two complete flowchart versions, one using line connectors and the other utilizing on-page connectors. Use the space below for one chart and the next page for the other chart.

For flowchart using line connectors.

For flowchart using on-page connectors.

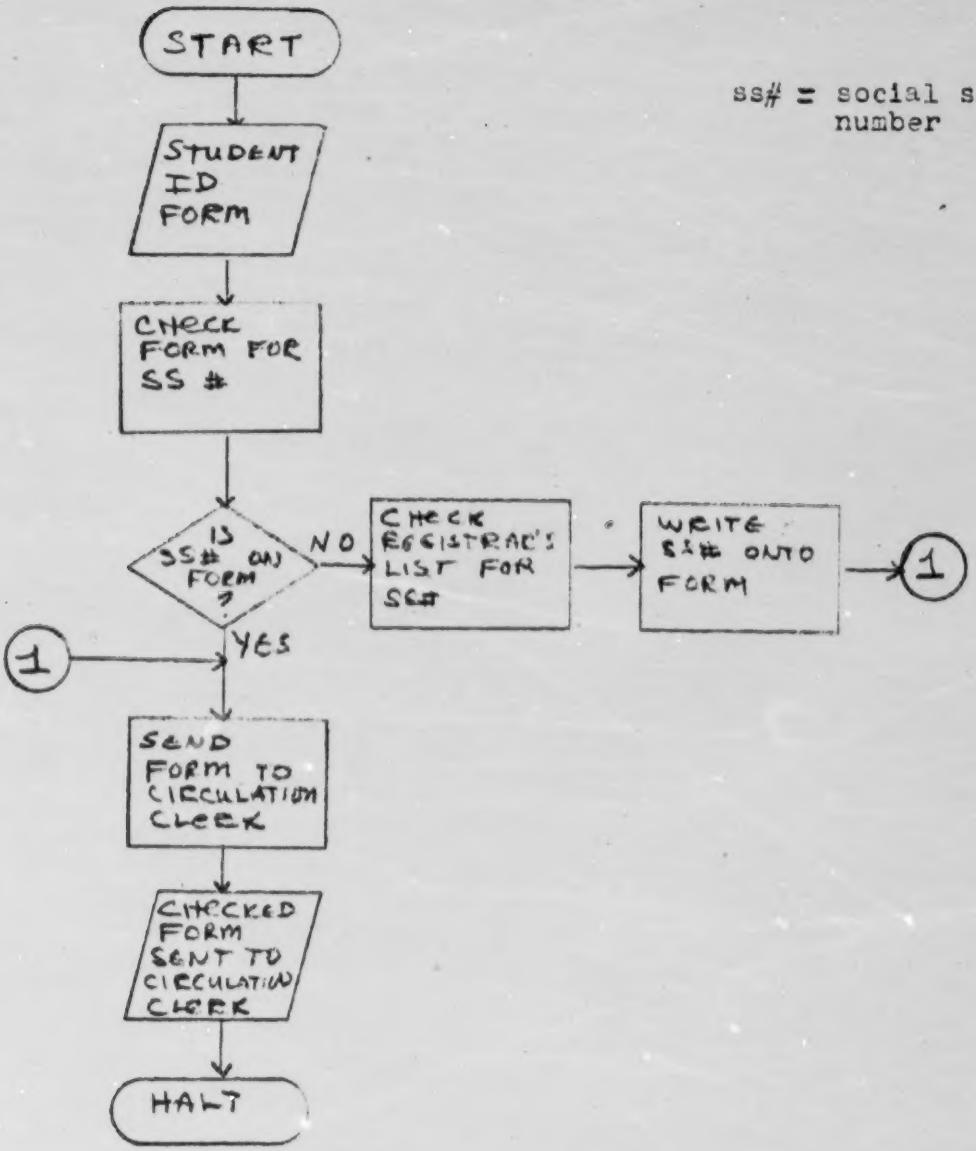
Please go on to tne next page to verify your flowcharts.

Checking student forms for social security number - flowchart using line connectors



ss# = social security number

Checking student forms for social security numbers - flowchart using on-page connectors



ss# = social security number

Now go onto the next page for the next frame.

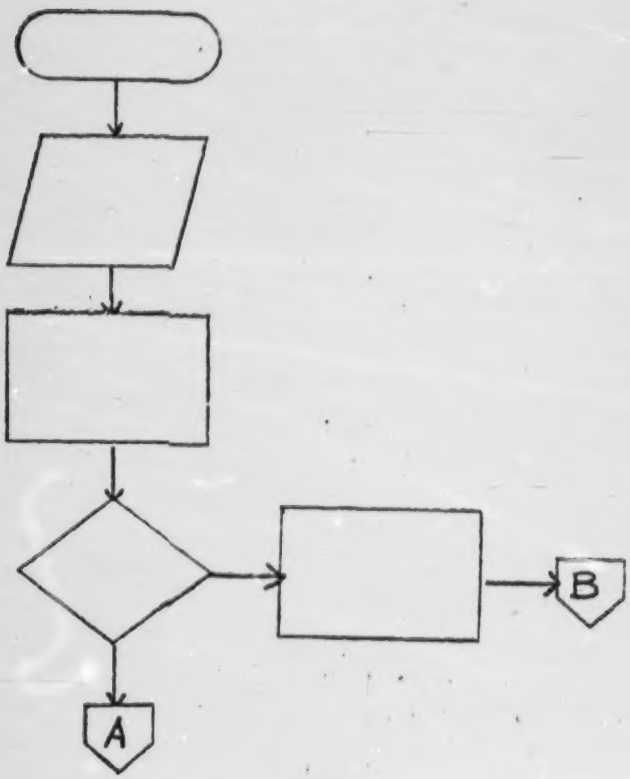
Frame 54

Occasionally it is necessary to continue a flowchart onto another page. In these cases an off-page connector symbol is utilized. Using your flowcharting template draw an off-page connector symbol below.

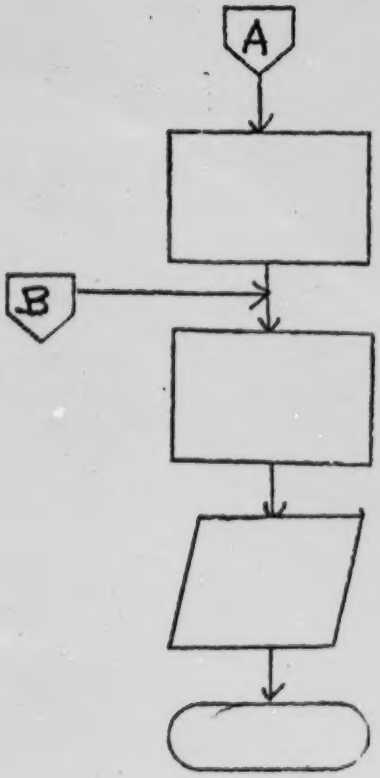
see page 2 in confirmation section

Frame 55

This symbol may be used in the following manner.

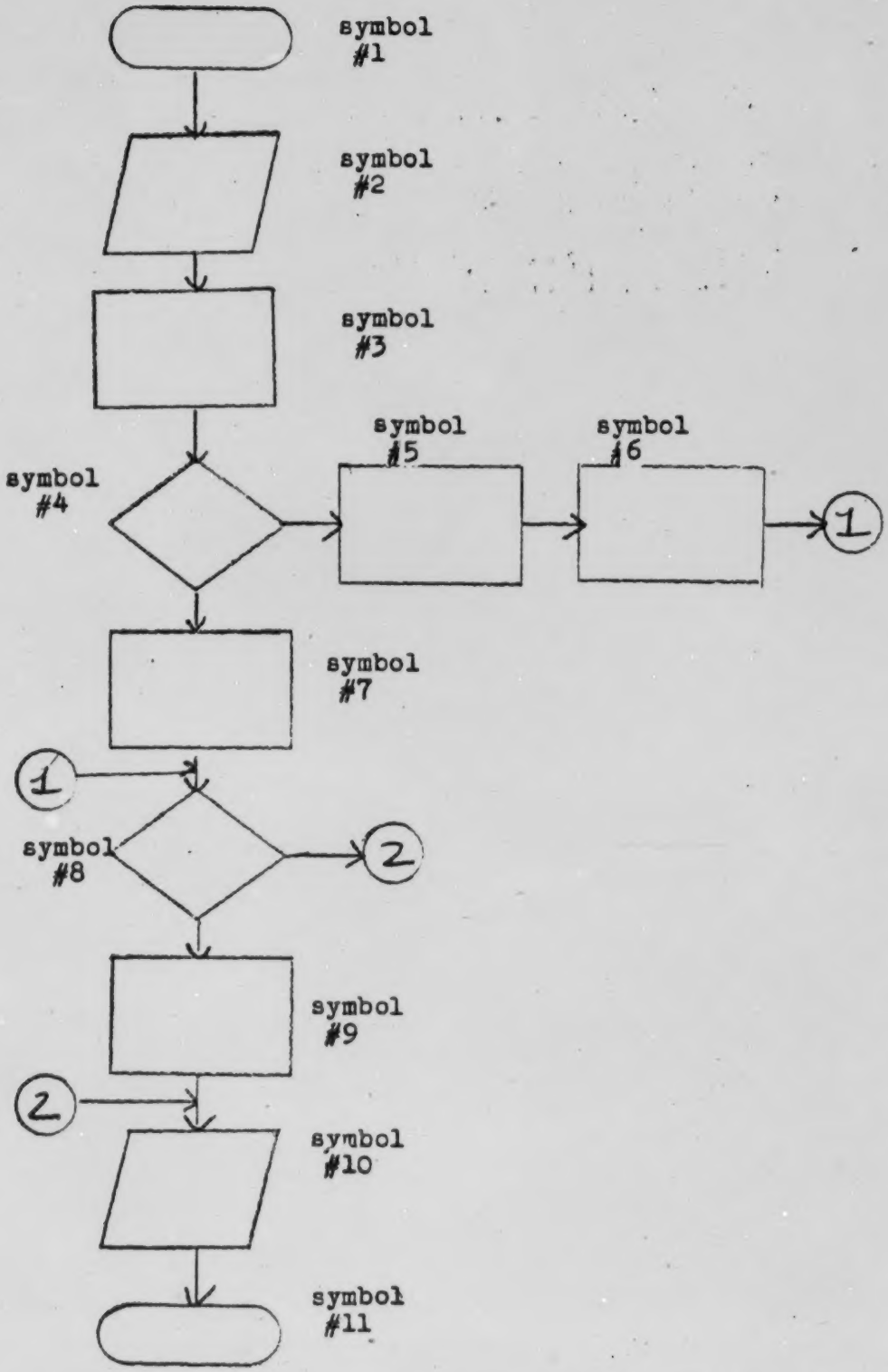


Go to the next page for the continuation of this flowchart.



You will notice that the off-page connector can be used to connect one symbol to another symbol anyplace within the flowchart. Again as in the case of on-page connectors, any alpha or numeric symbol may be used to connect the flow of activity.

Now please turn to the next page and look at the rather long flowchart.



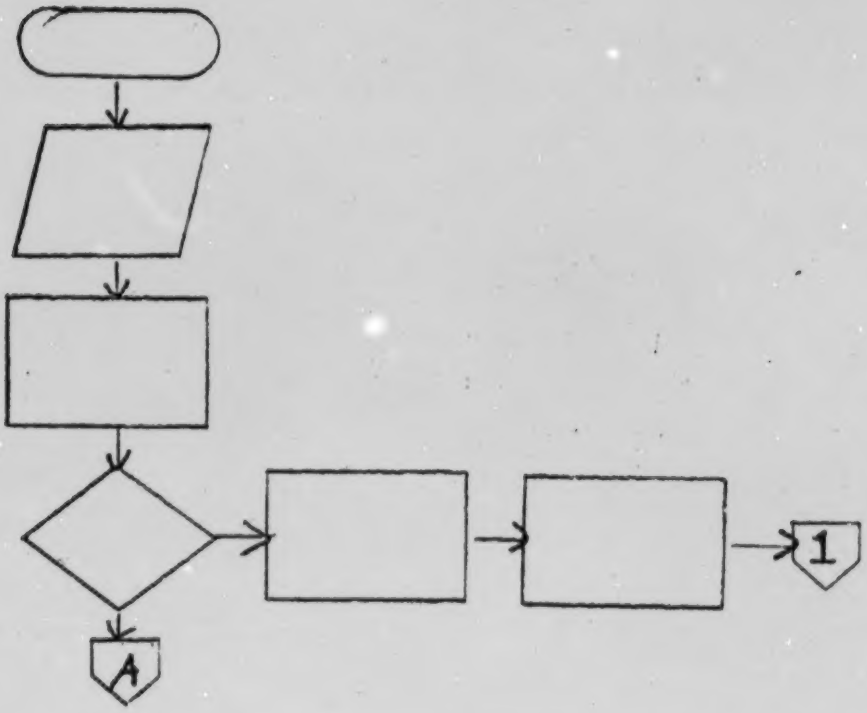
Using the above flowchart draw this as if the chart had to be continued onto another page starting at symbol #7. Use the next two blank pages for this purpose.

First part of flowchart

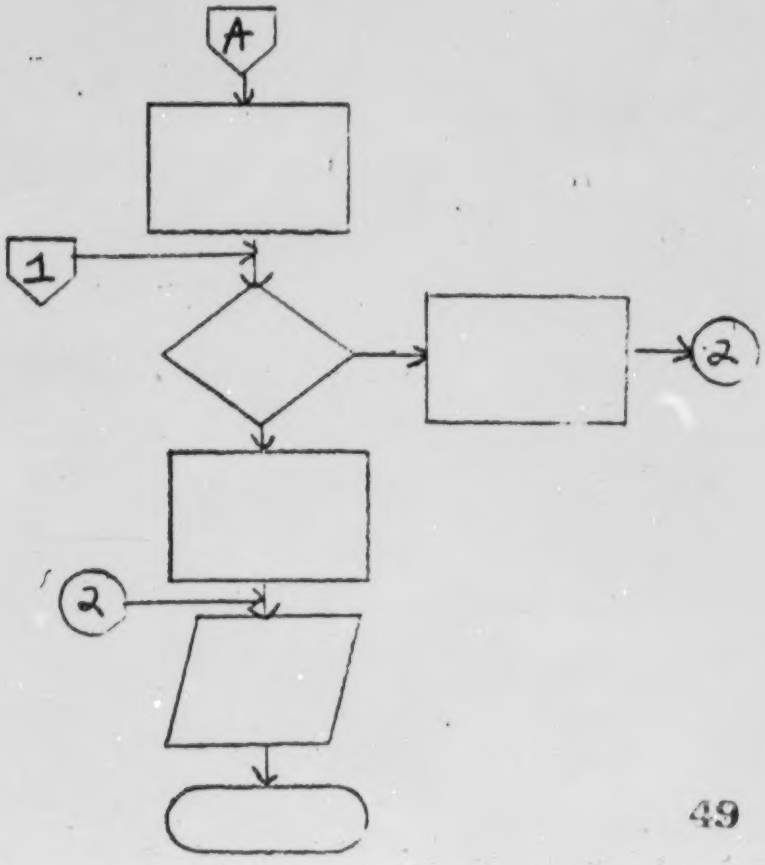
Second part of flowchart.

Please go onto the next page for confirmation of your flowchart responses.

The first part of the flowchart should look like the following.



The second part or second page of the flowchart should look like the following.



Frame 56

Additional symbols have been added to the basic flowcharting symbols in order to clarify and make specific some of the inputs, outputs, and processes. These additional symbols include the specialized document and file symbols and the predefined process symbol. Using your template draw a document, a file, and a predefined process symbol.

see page 2 in confirmation section

Frame 57

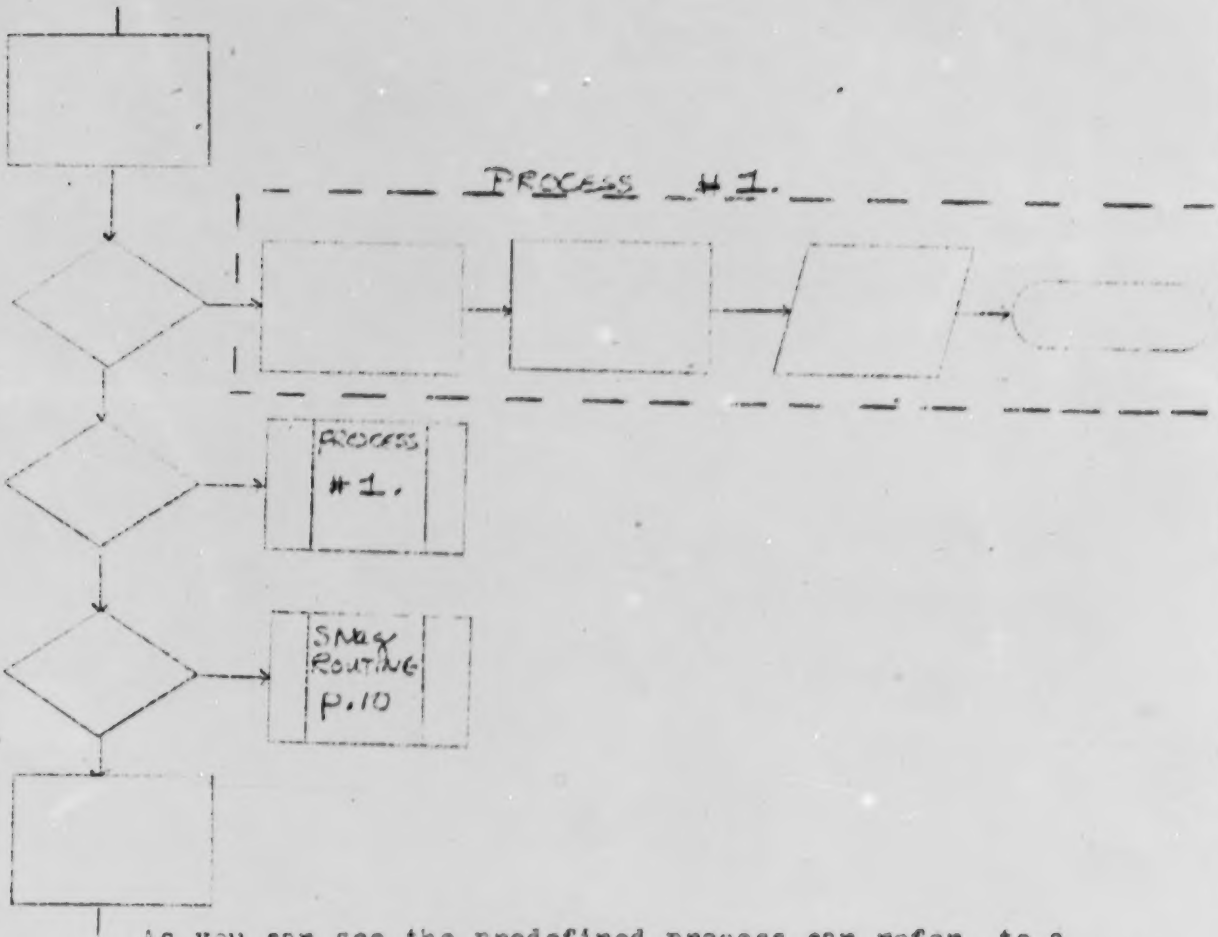
Both the document and the file symbol can be used to replace, where appropriate, the basic input and output symbol. Draw the symbol which the document and file symbol can replace. It should be noted that the document symbol, as an output symbol at the end of a flowchart, is followed by a halt symbol. In cases where a file symbol is used as a final output, a halt symbol is not required. The flowchart can end with the file symbol.

see page 1 in confirmation section

Frame 58

The predefined process symbol is used to indicate a flowchart or part of a flowchart which has already been described. In some instances you may have a particular routine which is performed a multiple number of times. Instead of redrawing the entire set of symbols, you may draw the flowchart once and refer back to that set of symbols using a predefined process symbol.

For example:



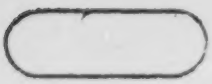
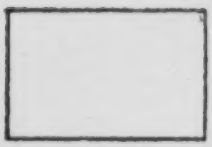
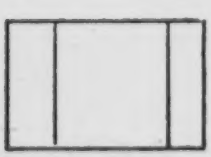
As you can see the predefined process can refer to a process in the same flowchart (as enclosed by the dotted line and appropriately titled), or it can refer to another separate flowchart within a group of flowcharts. It should be noted that a flowchart can end with the predefined process symbol; or an appropriate on-page or off-page connector can be used after the symbol to identify continued activity.
Now what is the function of a predefined process symbol?

It takes the place of a previously charted set of symbols.

Frame 59

Now you have all the basic manual flowcharting symbols. Please draw all the symbols and indicate the appropriate activity or function they represent. You should draw eleven symbols and indicate thirteen different functions.

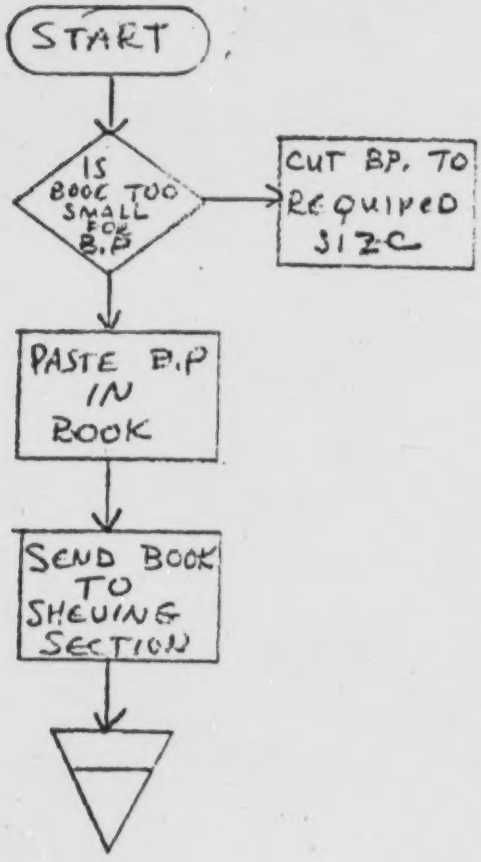
Please go onto the next page to confirm your responses.

SYMBOL	FUNCTION
	start halt
	input output
	process
	decision
	document
	file
	off-page connector
	on-page connector
	directional line directional arrow
	predefined process

Frame 60

Now look at the following two flowcharts. Both of these flowcharts are drawn incorrectly. Draw correct versions of both of these flowcharts.

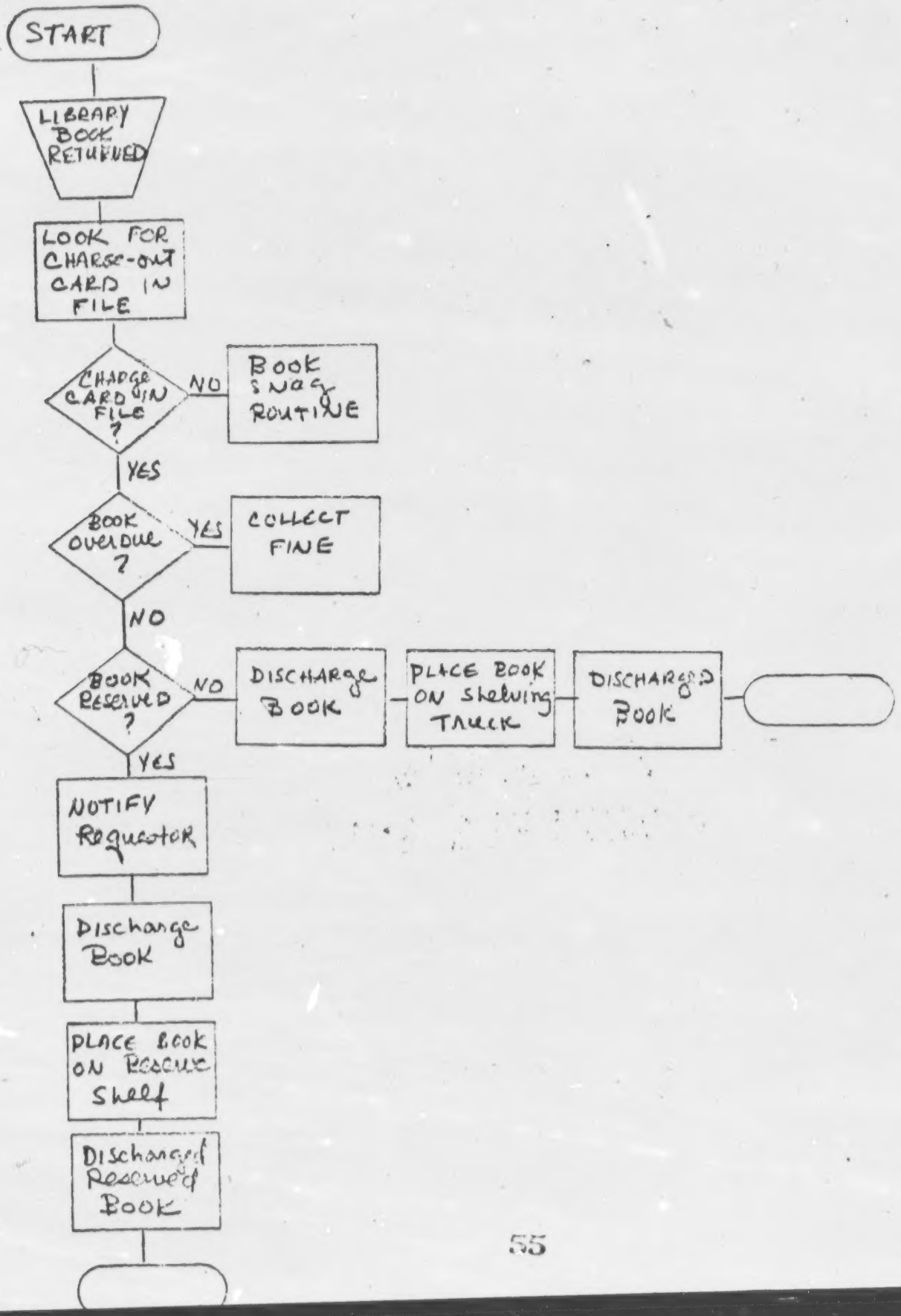
Flowchart A



B.P. = BOOKPLATE

Now go onto the next page for the other sample flowchart.

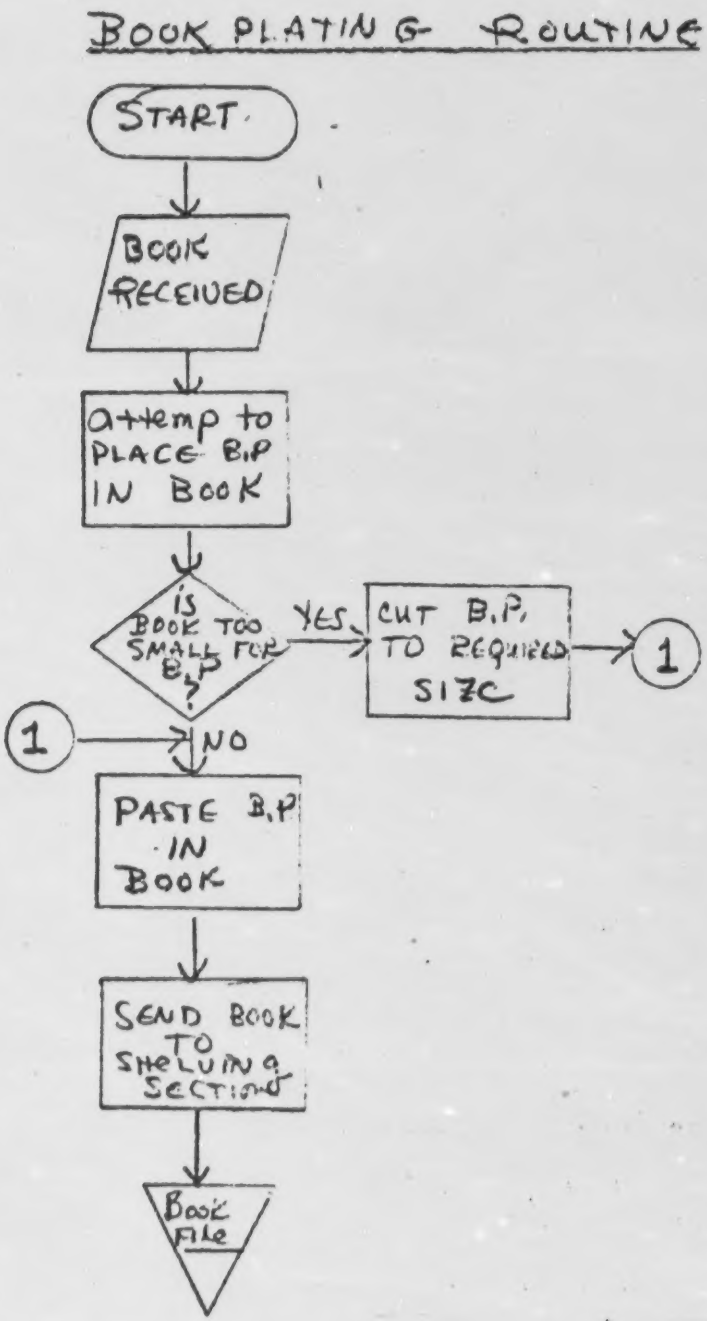
FLOWCHART B


START
LIBRARY BOOK RETURNED
LOOK FOR CHARGE-OUT CARD IN FILE
CHARGE CARD IN FILE ?
NO
BOOK SNAG ROUTINE
YES
BOOK OVERDUE ?
YES
COLLECT FINE
NO
BOOK RESERVED ?
NO
DISCHARGE BOOK
PLACE BOOK ON SHELVING TRUCK
DISCHARGED BOOK
YES
NOTIFY REQUESTOR
Discharge Book
PLACE BOOK ON RESERVE Shelf
Discharged Reserved Book

54

Please draw a correct version of flowchart A on this page.

Correct version of flowchart A

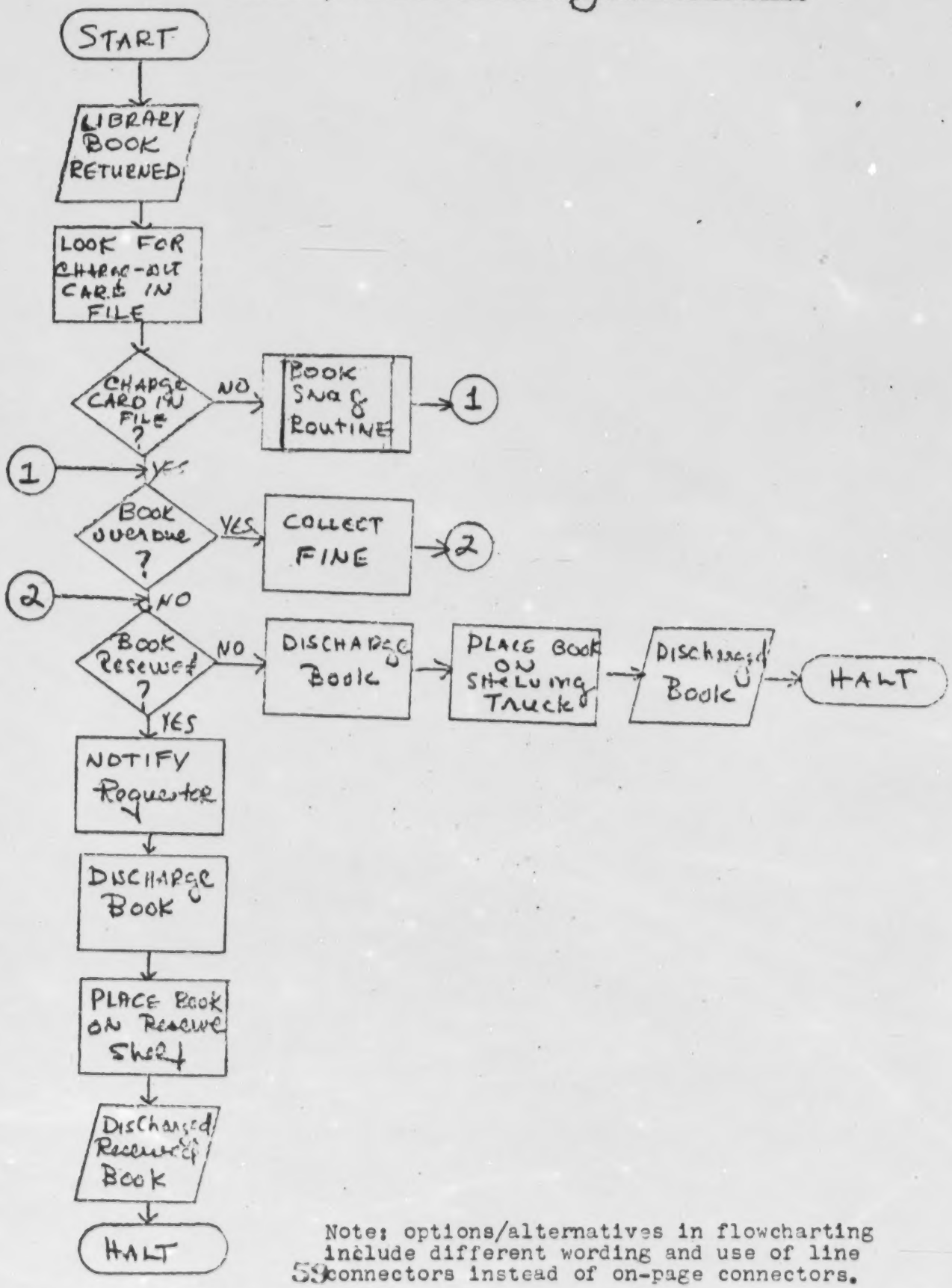


Note: possible options/alternatives in drawing the flowchart include line connectors rather than page connectors; different wording; regular output symbol followed by a halt.

Please draw a correct version of flowchart B on this page.

Correct version of Flowchart B

LIBRARY BOOK DISCHARGE ROUTINES



Note: options/alternatives in flowcharting include different wording and use of line connectors instead of on-page connectors.

Frame 61

Now please flowchart correctly the following narratively described system.

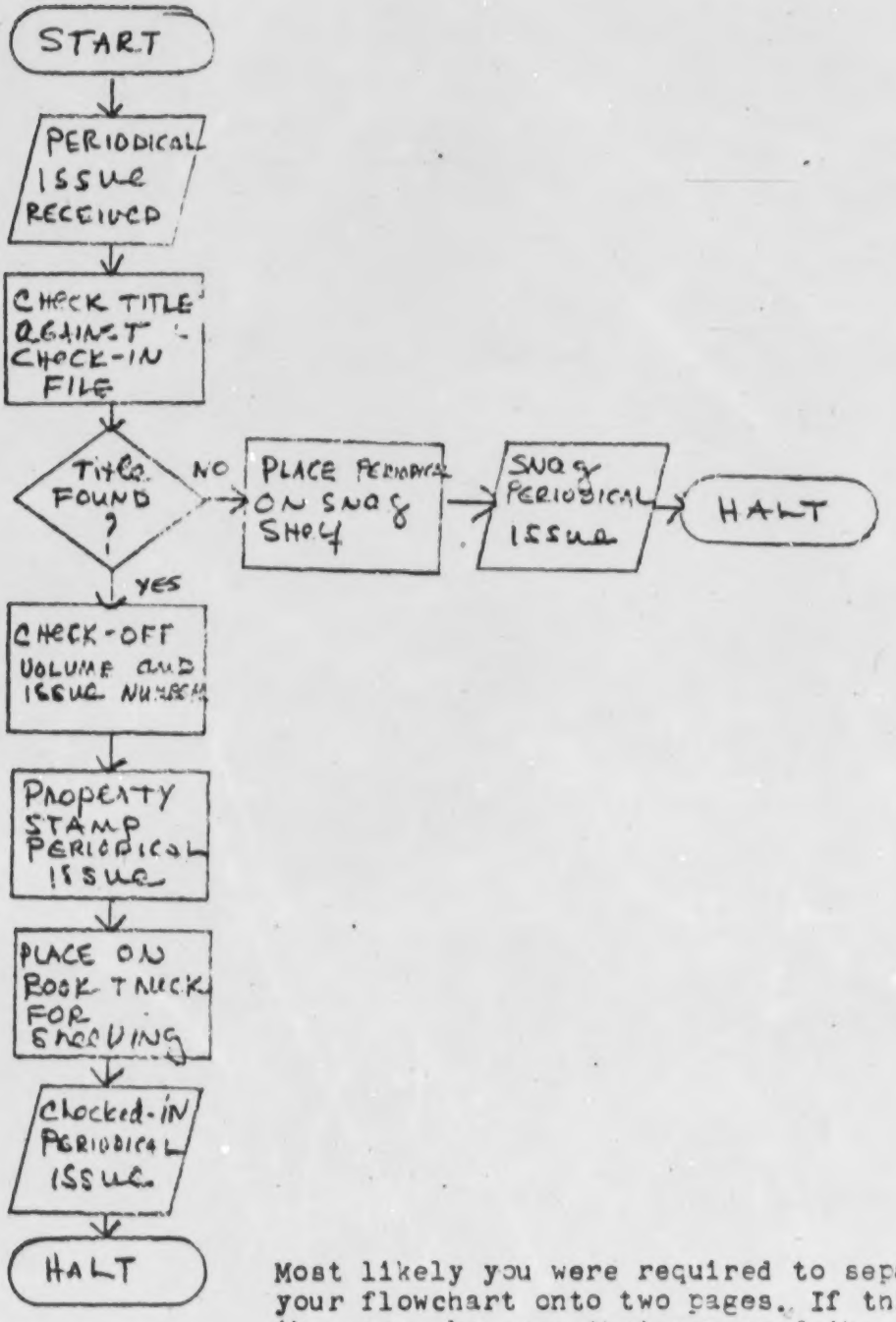
I take the periodical issue which has been received and check its title against the periodical check-in file. When I locate the title, I check off on the check-in form the specific volume and issue number of the received periodical. I then property stamp the periodical issue and place it on a book truck to wait for shelving. In those cases where I can't find the periodical title in the check-in file, I place the periodical issue on the snag shelf for the senior clerk to check.

Please use the space below and the next blank page to draw your flowchart of the above described system.

Now please go on to the next page for confirmation of your flowchart.

Correct version of flowchart for frame 61

PERIODICAL CHECK-IN PROCEDURE



Most likely you were required to separate your flowchart onto two pages. If this was the case, be sure that you used the off-page connector symbol to connect the flow of activity from one page to the next as in the response to the question raised in frame 55.

Frame 62

Now choose a system on your own to flowchart. Be sure that the system is not too simple or too complex. The narratives used in frames 42 and 61 and the flowcharting examples in frame 60 are good ideals as far as length and complexity are concerned. When you have completed your flowchart, double check it for logical and charting errors. When you are sure your flowchart is correct, have your instructor or systems analyst check the results.

Please use the space below and the following blank page for your flowchart.

If possible remember to have your instructor or systems analyst check you flowchart.

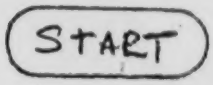
You have now completed the program on manual flowcharting. If you wish to review what you have learned, take the test which begins after the confirmation section.

64

III. Confirmation Section for Program

Confirmation Section - Page 1

Frame 14

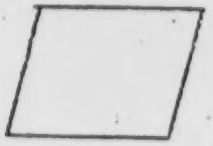


Frame 24

Frame 51

Frame 57

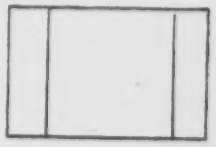
Frame 15



Frame 43

Frame 54

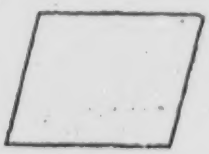
Frame 56



Confirmation Section - Page 3

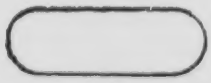
Frame 16

Frame 20

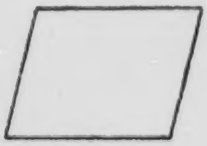


Frame 17

Frame 22



1. START
2. HALT



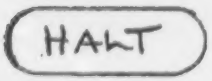
3. INPUT
4. OUTPUT

5. PROCESS

6. DECISION

Confirmation Section -Page 5

Frame 19



IV. TEST

Please answers the questions as indicated below:

1. In your own words provide a definition for flowcharting.

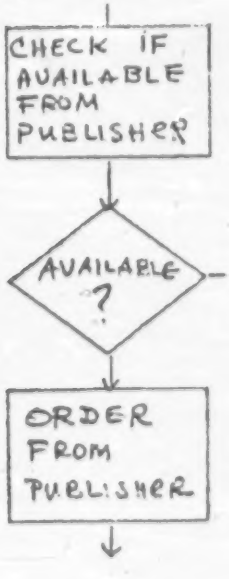
2. Which of the following are valid purposes for flowcharting. Please circle the correct response(s).

   a. documenting an activity
   b. useful for evaluating an activity
   c. used in designing a new system
   d. can be used to divide a process into its parts

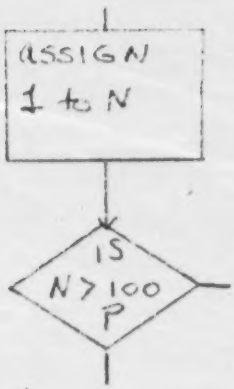
3. What are the two basic types of flowcharts. Please circle the correct reposnse(s).

   a. general and specific
   b. system and subsystem
   c. system and programming

4. Please indicate what kind of flowcharts each of the following are:



_____?_____ flowchart



_____?_____flowchart

5. Please circle any of the following manual processes which would lend themselves best to flowcharting:

   a. accounting system of a medium-sized department store
   b. circulation department activities of a college library
   c. duties of a single clerk in the State Department of Motor Vehicles

6. Identify the following basic flowcharting symbols by matching the number of the symbol next to its function.

(number)

a. process_____
b. decision_____
c. input/output_____
d. file_____
e. on-page connector____
f. predefined process____
g. document_____
h. start/halt _____
i. off-page connector____
j. invalid symbol_____

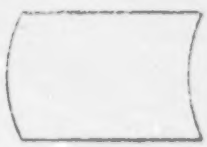
1

2

3

4

5

6 

7

8

9

10

7. What is the first symbol which is drawn on a flowchart. Please circle the letter corresponding to the correct response.

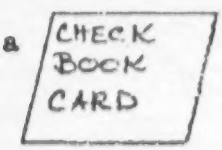
a

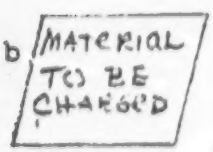
c

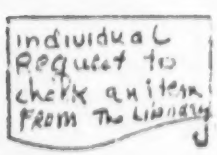
b

d

8. Which of the following are correct inputs to a flowchart. Circle the correct response(s).

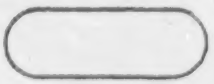
a 

b 

c 

9. What is the second symbol which should be drawn on a flowchart. Please circle the letter corresponding to the correct response.

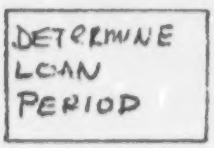
a

c 

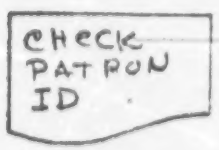
b

d

10. Which of the following are correct processes. Please circle the letter corresponding to the correct response.

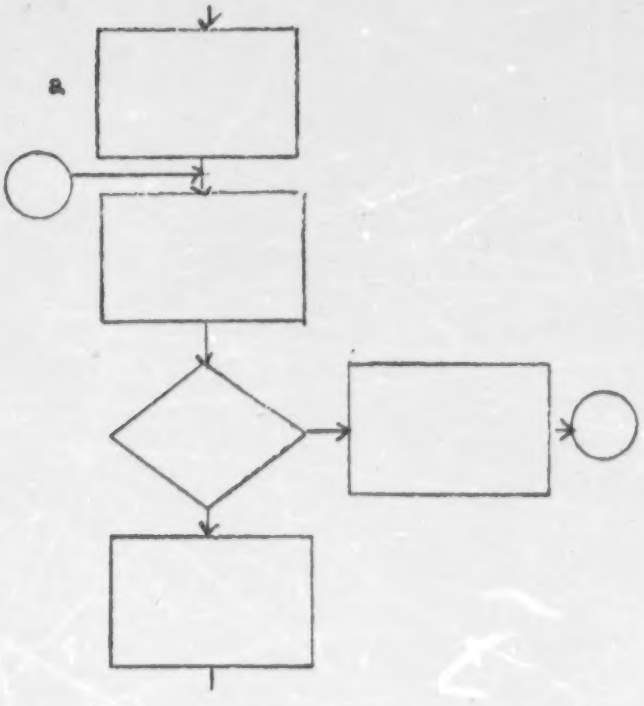
a 

b

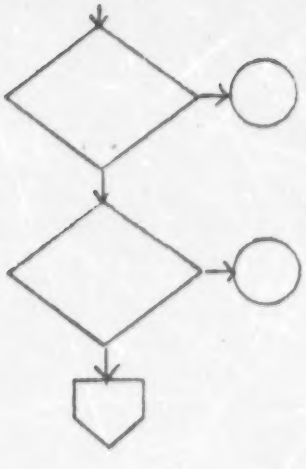
c 

11. Which of the following flowcharts appear correct. Circle the letter corresponding to the correct response(s). Please note that these are not to be considered complete flowcharts but only segments of complete charts.

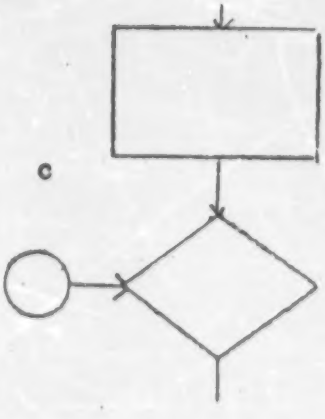
a



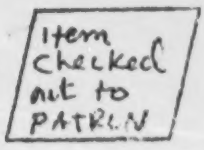
b

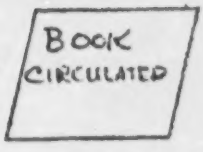


c



12. Which of the following are correct outputs from a flowchart. Please circle the letter corresponding to the correct response(s).

a 

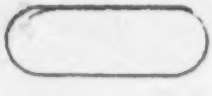
b 

c

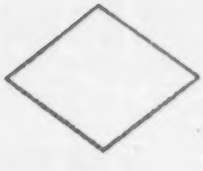
13. Which of the following is the last symbol which is found on a flowchart. Please circle the letter corresponding to the correct response(s).

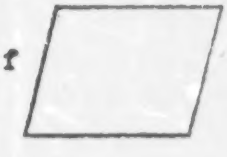
a

d

b 

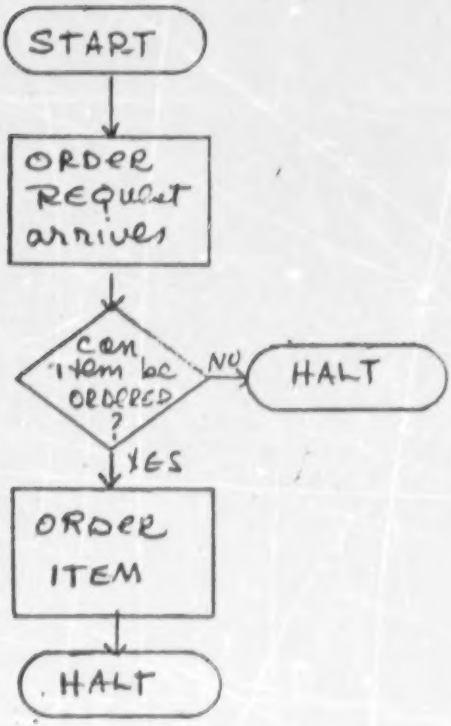
e

c 

f 

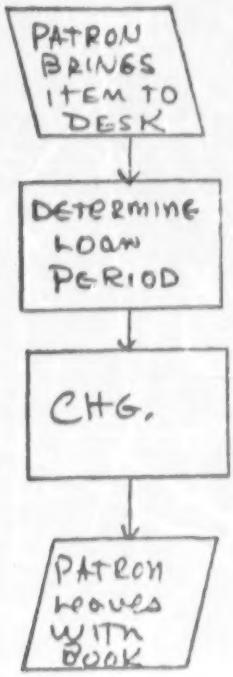
14. Identify the correct flowchart(s), if any, from the following examples. Please circle the letter corresponding to the correct response(s). Also next to any flowchart which is incorrect, if any, list the appropriate errors.

a



error listing(if any)

b

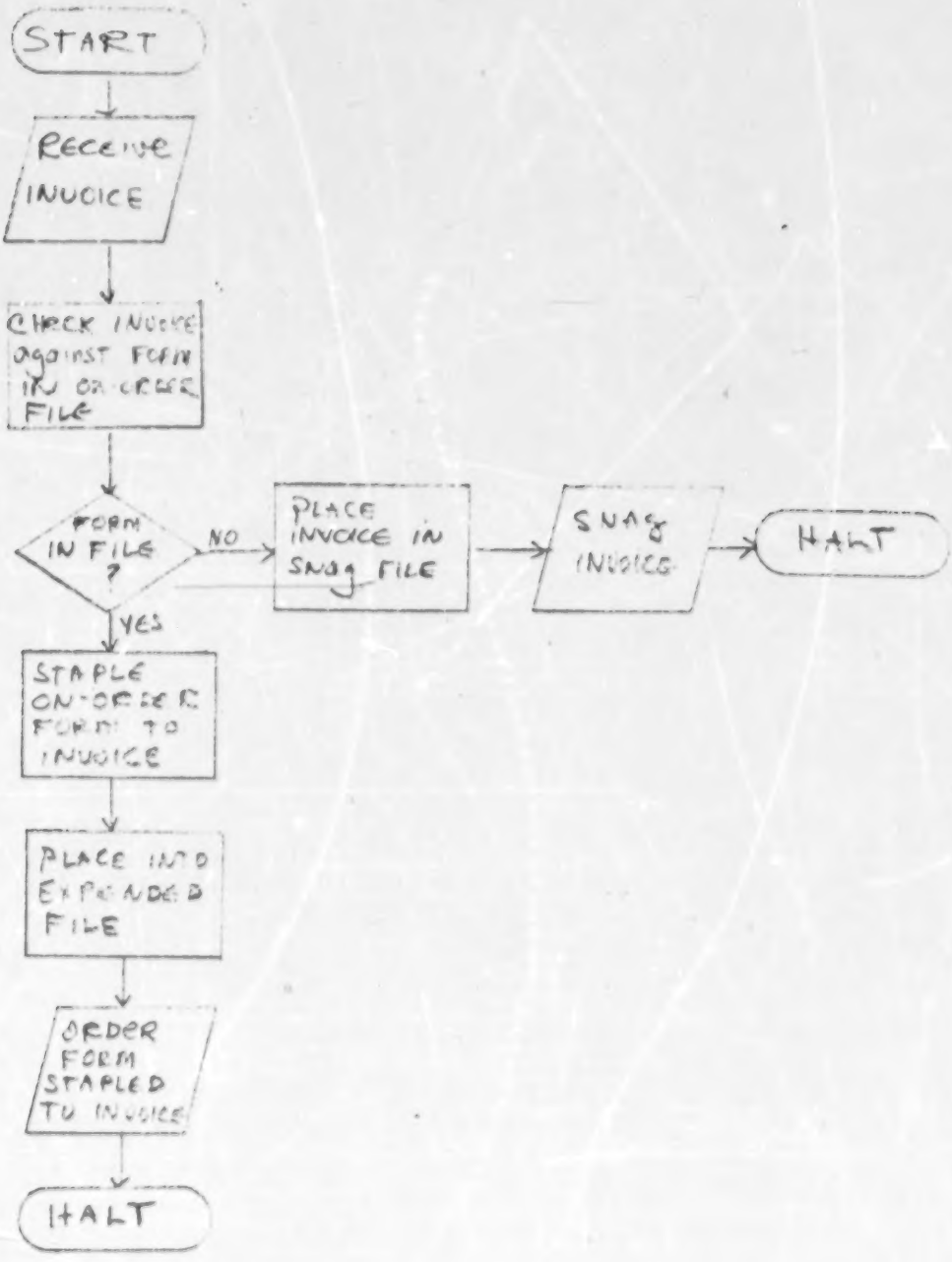


15. Now please flowchart the following narrative:

The clerk takes the received invoices and checks these against the on-order file. When she finds the individual order forms she stamples these to the invoices. She then places the invoice with its corresponding order forms stapled to it into an expended file. In those cases where the clerk cannot locate the order forms in the on-order file, the invoice is then placed into a snag file.

Now check your responses to the questions in this post-test to the answers on the next page.

15. Invoice Routine



TEST RESPONSES

1. your definition should indicate that flowcharting is a process, divides a complex problem into parts, and uses symbols to graphically represent activities.

2. a,b,c,d

3. c

4. system
   programming

5. a,b,c

6. a-4
   b-2
   c-5
   d-7
   e-3
   f-10
   g-8
   h-1
   i-9
   j-6

7. c

8. b

9. a

10. a

11. a,b

12. a,b,c

13. b

14. neither flowchart is correct

flowchart a
1. no title
2. no input
3. no output
4. possible a process should occur after no decision

flowchart b
1. no title
2. no start
3. no halt
4. no abbreviation for 'chg'
5. input symbol reversed

V. APPENDIX

BEHAVIORAL OBJECTIVES

Main Objective:

The learner will choose a manual process and will document this process using standarized flowcharting techniques with no logical or drawing errors.

Subobjectives:

1. Definition Section

   A. the learner will define flowcharting as a process and include in his definition the steps of analysis and documentation with the utilization of standardized symbols

   B. the learner will list three separate uses for flowcharting

   C. given examples of different flowcharts, the learner will distinguish between programming and systems flowcharts.

2. Introductory Analysis

   A. the learner will specify in writing the primary input and output of the process he is to flowchart

3. Task Analysis

   A. the learner will specify in writing the individual tasks which are required for the functioning of the process

      a. after specifying in writing the individual tasks of the process, the learner will check these tasks to make sure there are no logical errors

      b. the learner will check each task for completeness, trivia, and logic and will add or eliminate tasks if necessary

   B. after completing the listing of the tasks, the learner will indicate next to each task item whether it is a process or a decision

C. In cases of decision activities, the learner will define in writing the possible alternative actions, if not yet specified previously in the listing of the steps

4. Charting Techniques

A. using the process he is analyzing, the learner will translate the process into no more than ten specific terms and write these on the top of the paper he is to flowchart on

B. given the various symbols on the flowcharting template, the learner will identify these and construct a flowchart with no errors

a. using the flowcharting template the learner will draw a start symbol with the term start in it near the upper left hand side of the paper

b. taking the primary input which he specified earlier the learner will translate this into a phrase of no more than six terms

c. the learner will draw an input symbol one inch below the start symbol and write the input phrase into it

d. taking the first task, the learner will translate this into a phrase of no more than six terms

e. the learner will draw a process symbol one inch below the input symbol and write the first process task into the symbol

f. taking each of the remaining processes and decision steps, the learner will translate each into a phrase of no more than six terms and place each phrase into the correct symbol approximately one inch below the preceding symbol

g. when a decision is involved, the learner will place one alternative under the decision symbol and the other alternative to the right of the decision symbol

h. when required to return to the main flow, the learner will return using on-page connectors

i. when required to continue the flow onto another page, the learner will connect the flow using off-page connectors

j. taking the primary output which he specified earlier, the learner will translate this into a phrase of no more than six terms

k. the learner will draw an output symbol one inch below the preceding symbol and write the output phrase into the symbol

l. using the template the learner will draw a halt symbol with the word halt printed in it near the bottom of the page after the process has been concluded

m. using the ruler edge of the template, the learner will connect each symbol using a line and will show the direction of the flow using the directional symbol arrows from the template

5. Checking Routines

A. upon completing the flowchart, the learner will check each process/decision for completeness, trivia, and logic and will make any necessary corrections

B. if the learner has assigned any abbreviations in his symbol phrases, he will list these abbreviations and their definitions in the upper right hand corner of the flowchart

6. Summary Tasks

A. given sample manual flowcharts, the learner will list any errors in the charts and draw correct versions of these flowcharts

B. given any narrative description of a manual process, the learner will translate this narrative into its correct flowcharting format